

The Marin Countywide Plan

Transportation Element Technical Report #2 Travel Patterns in Marin and Sonoma Counties



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FEB 24 1993

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EXECUTIVE SUMMARY

In 1987, the County of Marin conducted a travel survey of Marin and Sonoma County residents for purposes of calibrating the Marin Transportation Model, a micro-computer based set of equations which simulate travel patterns in the Bay Area. The survey provided current data both for the update of the Countywide Plan and ongoing traffic engineering and operations decisions.

Due to the continued suburbanization of employment, travel patterns have changed since 1981, the year of a previous travel survey performed by the Metropolitan Transportation Commission (MTC). This survey was made to provide more current data than the data provided by MTC. The survey focused on the evening peak period, between 4:00 p.m. and 7:00 p.m., the time of worst congestion.

The Sample

A total of 1034 households were surveyed by telephone between 5:00 p.m. and 8:00 p.m. during the months of February and March, 1987. The sample included 793 households in Marin County and 241 households in Sonoma County. The major findings and conclusions are listed below.

Household Characteristics. Characteristics of the households surveyed included averages of 2.7 persons per household, 1.5 employed residents per household, and 2.2 automobiles per household. These averages, especially automobile ownership, were higher than those reported in the 1980 Census.

Trip Generation. Respondents reported making an average of 3.6 trips per day. Employed residents averaged between 3.7 and 4.2 trips per day while non-employed residents averaged 2.9 trips per day. The type of trips made include an average of 2.1 home-based work trips, 1.8 home-based shopping or school trips, 0.6 home-based recreation trips, and 0.7 non-home-based trips.

Trip Purpose. During the evening peak period between 4:00 p.m. and 7:00 p.m., the time period with the worst congestion, the predominant trip type was work-to-home (51% of all trips). Fourteen percent (14%) of respondents reported additional peak period home-to-shopping trips; ten percent (10%) reported shopping-to-home trips (possibly the return trip); and ten percent (10%) reported work-to-other trips, such as errands on the way home from work.

Mode Choice. Seventy-five percent (75%) of respondents chose to drive alone during the evening peak periods and sixteen percent (16%) chose to carpool. Sonoma residents had a much higher rate of carpooling than Marin residents, 24% compared to 14%. Marin residents were more likely to use transit, bus or ferry, than Sonoma residents. Four percent of Marin commuters rode the bus or ferry, and most of those people were returning from jobs in San Francisco.

Origin and Destination of Trips. The origin and destination pattern of the work-to-home trips reflected the northbound orientation of the evening commute, but most commuting was within the respective counties. Sixty-four percent (64%) of Marin residents commuted within Marin County; seventy-five percent (75%) of Sonoma residents commuted within Sonoma County. Inter-county commute patterns had a northbound orientation: twenty-five percent (25%) of Marin County residents returned from jobs in San Francisco, and sixteen percent (16%) of Sonoma County residents returned from jobs in Marin.

Within Marin and Sonoma Counties, the degree of northbound commuting depended on the size of a given city and number of jobs within that city. Because Santa Rosa and San Rafael are relatively large cities with many jobs, a high percentage of residents' commute trips remained within those respective cities. Sixty-eight percent (68%) of Santa Rosa residents worked in Santa Rosa. Forty-four percent (44%) of San Rafael residents worked in San Rafael. In smaller cities, a majority of residents returned from jobs located south of home. Cities of Southern Marin, with the exception of Mill Valley, exhibited a pattern of reverse commuting - residents were returning from jobs located north of home. Average work-to-home trip lengths for Sonoma residents was 13.4 miles. Marin residents commuted an average of 11 miles.

Conclusion

The travel survey provides some much needed current data for Marin County's transportation planning efforts, including trip generation rates, origin-destination pairs, and mode choice. Origin-destination responses highlighted the northbound direction of the evening commute, but indicated that when a city has a high number of jobs available for its residents, many people may remain in the city. The listing of trip purposes showed that people were willing to make discretionary trips, such as shopping, during the evening peak period. One cannot infer, however, that residents willingly subject themselves to the same congested traffic in which they drove home. They may wait until traffic lightens or go to places that do not require freeway access, yet still make the trip within the three-hour peak period.

I. INTRODUCTION

In February of 1987, the County of Marin conducted a survey of Marin and Sonoma County residents to determine their travel patterns during the evening peak period. The purpose of the survey was to obtain information necessary to calibrate the Marin Transportation Model (MTM). MTM is a micro-computer-based set of equations which simulate travel in Marin County. Using EMME/2, a specially designed transportation software package, the County has modelled travel behavior on the road network as part of the update of the Countywide Plan. Calibration of the model involves making sure the numeric inputs, representation of the road system, trips between traffic zones, and coefficients of the equations accurately model real travel behavior. Traffic counts and surveys such as this are the means of observing behavior.

First, substantial job-generating development has occurred in suburban counties, while job growth in central cities such as San Francisco and Oakland has been modest. This change has resulted in more commuting between and within suburban counties.

Second, the rapid escalation of housing costs since 1981 has forced people to move farther from their job sites even as those jobs relocated to suburbia. For example, job growth in San Rafael, accompanied by rising housing prices in Marin County, has resulted in increasing numbers of commuters living in Sonoma County, where housing prices are lower. Therefore, transportation models based on the traditional suburb-to-central city commute pattern will inaccurately represent the longer suburban trips occurring today.

Third, household size and composition are continually changing. Household size decreased between 1960 and 1980; yet the number of employed residents per household increased. During the same twenty year time period, household composition diversified to include more non-family and single parent households. As a result of these changes, the trip-making behavior of these households may have shifted towards more work-related trips and possibly fewer shopping trips. The survey was necessary to confirm whether the historical trends in household characteristics and trip-making behavior have continued.

In addition to updating data on local travel behavior, the survey also sought to obtain information on the public's perceptions and attitudes concerning "mode choice," the means by which people choose to travel. Knowledge of the public's mode choice preferences allows elected officials and County staff to better assess alternate transportation services. The respondents were also asked to evaluate traffic conditions, in order to give elected officials an indication of their sentiments regarding the severity of current transportation problems.

A. THE QUESTIONNAIRE

The survey asked questions about household characteristics, travel patterns, and perceptions concerning mode choice. Examples of questions about household characteristics included: "How many people live in your household?"; "How many employed residents are there in your household?"; and "How many autos are owned by residents in your household?" In the second set of questions, the respondent described his or her travel patterns, including the number, type, and time period of the trips made, their origin and destination, purpose, and the mode choice. The respondent was also asked about the travel patterns of his or her spouse or another adult in the household. After determining why the respondent chose a particular mode for that evening's trips, the survey questioned why the respondent did not choose an alternate mode and what might persuade him or her to use another mode. Finally, the respondent was asked whether he or she considered traffic conditions to be great, good, acceptable, or poor.

B. THE SAMPLING METHODOLOGY

Based on the length of time necessary to complete one questionnaire, the budget for the survey permitted approximately 1,000 households to be interviewed. Because of the increasing significance of Sonoma to Marin commuting, staff included some Sonoma households in the survey. It was decided that approximately 750 Marin County households and 250 Sonoma County households would be interviewed. The survey was conducted by telephone between 5:00 p.m. and 8:00 p.m. on successive nights during February and March of 1987.

Each of the two counties was divided into study areas consisting of two smaller cities (including adjacent unincorporated areas), a whole city, or portions of a larger city. Examples of combined cities included San Anselmo and Fairfax, Tiburon and Belvedere, and Larkspur and Corte Madera. Examples of whole cities included Novato, Mill Valley, and Petaluma. San Rafael was divided into two study areas: North San Rafael, and Central and East San Rafael. The rationale for choosing the composition of the study areas was that each city or unincorporated community within the area would have similar access to Highway 101.

Next, the number of households in each study area was calculated from the 1980 Census. The reverse telephone directory, listing telephone numbers by street address, was used to tabulate the number of listings in proportion to the number of households in the area. The first three digits of a telephone number indicate the location of the residence. For example, if five percent (5%) of the households in Marin were in Mill Valley, staff would need responses from five percent (5%) of the city's listings. The number of responses necessary would be five percent (5%) of 750, or 38 households.

The study design took into account that not every person called would be home or would choose to respond, and consequently used a larger sample to get the required number of responses. An initial pretest of the questionnaire indicated that one out of every three listings called would respond. Staff divided the number of listings in the reverse directory by three times 38 (to continue with this example). If there were, for example, 1,200 listings, every eleventh listing would be called (1,200 divided by 38 times 3 equals 11). After choosing a random number between one and eleven to begin the selection process, staff marked the listings. Telephoning continued until the required number of responses was obtained. All responses were confidential. The names and addresses of the respondents were not recorded.

C. CONFIDENCE INTERVALS OF SAMPLE RESULTS

Because all surveys only approximate the results which would be obtained if the whole population were sampled, the issue is what confidence one might have in the findings - how accurately do the results correspond to reality? It is common in social science research to use a 95% level of confidence for interpreting survey findings. This means that the researcher can be certain 95% percent of the time that the characteristic being measured in the population falls within a known interval surrounding the specific survey finding.

Using the statistical formula for determining the standard error of an estimate at the 95% level of confidence, staff calculated the range within which the actual value will reside. For the sample size of 1034, the interval is plus or minus 3%. The Marin County sample size of 793 requires an interval of plus or minus 3.5%. The smaller Sonoma County sample of 241 requires an interval of plus or minus 6%. For example, the percentage of households having only one person was 15.7% as calculated from the total sample. It is 95% certain that the actual percentage of one-person households falls between 12.7% and 18.7%. For Sonoma County findings, the range is rather broad: the survey finding was 15.4%; the 95% confidence interval is 9.4% to 21.4%. It is for this reason that caution should be exercised in the interpretation of Sonoma County findings.

II. HOUSEHOLD CHARACTERISTICS

A total of 1034 households were sampled. Of the total, 793 households were called in Marin (76.7%) and 241 households were called in Sonoma (23.3%). It is imperative that caution be exercised in the interpretation of travel data that has not been separated into Marin and Sonoma portions. For example, origin-destination tables produced from 1034 total responses severely undercount trips made by Sonoma residents. For this reason, all travel-related data were separated by county. Percentages, not actual numbers, were used for comparisons.

It was important to determine several household characteristics because they have a significant influence on the number and type of trips the household makes. Household size, number of employed residents per household, and number of automobiles per household were the characteristics surveyed. Generally, the larger the household size and greater the number of employed residents, the more trips the household makes. The number of automobiles also influences mode choice. Higher rates of automobile ownership would translate into more autos on the road, especially autos with only one occupant, because more adults would have their own car.

A. HOUSEHOLD SIZE

The following table shows the results of the 1987 travel survey for the variable of household size:

Table 1. 1987 Travel Pattern Survey: Household Size

Number of Persons Per Household	Sample		Marin		Sonoma	
	#	%	#	%	#	%
1	162	15.7	125	15.8	37	15.4
2	399	38.6	319	40.2	80	33.2
3	214	20.7	166	20.9	48	19.9
4	166	16.1	121	15.2	45	18.7
5	68	6.5	48	6.1	20	8.3
6+	25	2.4	14	1.8	11	4.6
Total	1034	100.0	793	100.0	241	100.1

Source: Marin County Planning Department

The average (mean) size of all households sampled was 2.7 persons. The average size for Sonoma County was larger than for Marin: 2.9 persons compared to 2.6 persons. Because an average is biased upwards by the existence of larger households, it is more appropriate to calculate a median. The median is a "halfway" point in the range of sizes from smallest to largest, with half the households smaller than the median and half larger. The median household size for the entire sample was 2.4. Marin had a median household size of 2.4, and Sonoma had a median household size of 2.6.

Both the mean and median household sizes reported from the survey are larger than those listed in the 1980 Census. For Sonoma County, the 1980 Census listed a mean household size of 2.56 people, compared to the survey result of 2.9 people. In Marin, the 1980 Census listed a mean household size of 2.43, compared to the 2.6 gathered from the survey. The median household sizes differed by comparable amounts.

The survey results differ from the 1980 Census figures for two possible reasons. First, the survey sample may have been biased, resulting in the underreporting of one- or two-person households. It is possible that, for some reason, people who live in one- or two-person households were more likely not to be home when the survey was taken. If that is true, smaller households would have been undercounted.

A second possible reason for the difference is that household size may, in fact, be larger now than in 1980. There has been a "baby boomlet" during the 1980s which would increase household size. There is also anecdotal evidence that more young adults are still living with their parents because they cannot find affordable housing. High housing prices might also have forced more people to share housing units, thus increasing the number of people in a household.

B. EMPLOYED RESIDENTS

The survey indicated that Marin County households had an average of 1.5 employed residents. Sonoma County households had an average of 1.4 employed residents. Half of Marin's households had two or more workers, as did Sonoma's. Thirty-three percent of each county's households had one worker. Seventeen percent of each county's households had no employed residents. Table 2 lists the number and percentage of employed residents per household for the entire sample, and for Marin and Sonoma Counties.

The number of employed residents per household has increased since the 1980 Census, in both Marin and Sonoma Counties. The number has increased from 1.1 to 1.4 workers per household in Sonoma, and it has increased from 1.3 to 1.5 workers per household in Marin. This increase may be attributable to: 1) the continuing increased participation of women in the labor force; 2) the sharing of housing units by a greater number of employed people; and 3) the increased number of employed young adults who are living with their parents. The increase in the number of jobs in both Sonoma and Marin Counties has provided more employment opportunities for local residents.

**Table 2. 1987 Travel Pattern Survey:
Employed Residents per Household**

Workers Per Household	Sample		Marin		Sonoma	
	#	%	#	%	#	%
0	177	17.1	135	17.0	42	17.4
1	340	32.9	262	33.0	78	32.4
2	410	39.7	307	38.7	103	42.7
3	79	7.6	65	8.2	14	5.8
4+	28	2.7	24	3.0	4	1.7
Total	1034	100.0	793	99.9	241	100.0

Source: Marin County Planning Department

C. AUTOMOBILE OWNERSHIP

The average number of automobiles per households was 2.2. Seventy-five percent of the households had two or more automobiles. There is little difference between Marin and Sonoma with regard to automobile ownership. Marin households averaged 2.2 automobiles; while Sonoma households averaged 2.0 automobiles. As shown in Table 3, the percentage of households owning none, one, two, or three automobiles is very similar for Marin and Sonoma Counties. The table lists the number and percentage of automobiles per household for the entire sample, and for Marin and Sonoma Counties.

Table 3. 1987 Travel Pattern Survey: Automobile Ownership

Autos Per Household	Sample		Marin		Sonoma	
	#	%	#	%	#	%
0	31	3.0	18	2.3	13	5.4
1	228	22.0	180	22.7	48	19.9
2	477	46.1	362	45.6	115	47.7
3+	298	28.8	233	29.4	65	27.0
Total	1034	99.9	793	100.0	241	100.0

Source: Marin County Planning Department

Findings from the survey indicate an upswing in automobile ownership since the 1980 Census. Since 1980, the average number of automobiles per household increased from 1.8 to 2.0 in Sonoma County. In Marin the increase was even more substantial, from 1.7 to 2.2 autos per household.

The distribution of automobile ownership has also changed in both counties. In Sonoma, there has been a shift towards a household ownership of two cars rather than one. The percentage of households owning two cars increased from 34% in 1980 to 48% in 1987. The percentage of households owning one car decreased from 34% to 20% during the same time period. In Marin, the percentage of households owning two cars increased from 38% to 46%. The percentage of one-car households dropped from 38% to 22%. Also of note is that in Marin the percentage of households owning three or more cars rose from 19.3% to 28%, while the percentage of three-automobile households for Sonoma County increased from 25% to only 27%.

D. THE RELATIONSHIP BETWEEN HOUSEHOLD SIZE, WORKERS PER HOUSEHOLD, AND AUTOMOBILE OWNERSHIP

The relationship between household size, number of workers and number of automobiles per household can be inferred by comparing the mean number of automobiles per individual or worker in the household. One-person households own an average of one automobile; two-person households own an average of two automobiles. Three-person households average 2.5 automobiles, an average that does not rise much as household sizes increase. The conclusion is that while larger households, those with three or more people, own two or three cars, few own more than three cars.

The relationship between the number of workers per household and automobile ownership is more pronounced. Households with one worker own an average of 1.9 automobiles, and households with two workers own an average of 2.3 automobiles. Beyond that, each additional worker raises the average by one automobile. For example, a household with three workers would have three automobiles and so forth. It is reasonable to conclude that increasing automobile ownership is a function of an increasing number of workers.

III. TRAVEL PATTERNS

A. TRIP GENERATION

Of special interest to transportation planners is the number of trips people make each day. Because the numbers vary widely for specific individuals, it is common to generate a total number of trips and divide by the number of individuals. This produces an average number of trips, also defined as a trip generation rate. Overall,

the respondents in the survey averaged 3.6 trips per day. This average varied according to the person's wage earning status in the household. People who reported themselves as being primary wage earners, the person who earned the highest income of the household members, averaged 3.7 trips per day while people who were secondary wage earners, those who earned less than the primary wage earner, averaged 3.9 trips per day. People who reported themselves as equal wage earners averaged 4.2 trips per day. It is uncertain as to why equal wage earners would make more trips per day than either primary or secondary wage earners. People who reported themselves as not employed made the fewest number of trips per day, averaging 2.9.

During the time of worst traffic congestion, the evening peak period between 4:00 p.m. and 7:00 p.m., the average trip rate was .74 trips per person. A resident's employment status greatly influenced the likelihood of making a trip during the evening peak period. Employed people averaged between .84 and .92 trips, depending on wage-earning status. By comparison, people who were not employed averaged .35 trips during the evening peak.

B. TYPES OF TRIPS

Four types of trips are commonly used in transportation modeling: home-based work, home-based shopping or school, home-based recreation and non-home-based. "Home-based" means that the trip either originated from or returned to home. "Non-home-based" trips are work-related errands or personal errands performed on the way to or from work. Non-home-based trips may also be trips interspersed between the home-based trips during an outing consisting of many trips. For example, many non-home-based trips occur on Saturday when people are running errands.

For a 24 hour period, respondents reported 1,554 trips between home and work, 1,828 trips between home and shopping or school, 606 trips between home and a recreation facility, and 787 trips between the job and some location other than home. The trip generation rate for home-based work trips was 2.1; that is, the respondent made an average of 2.1 home-based work trips in a 24 hour period. The trip generation rate was 1.8 for home-based shopping or school trips, 0.6 for home-based recreation trips and 0.7 for non-home-based trips.

There was little difference between primary, secondary or equal wage earners for their average number of home-based work trips or recreation trips. For shopping or school trips, however, primary wage earners averaged only 1.3 trips while people not employed averaged 2.4 trips per day.

Because transportation modeling efforts focus on the period of the most severe congestion, the survey asked how many trips were made during the evening peak hour, the time of worst congestion. Traffic counts have shown that the most congested 60-minute period was between 4:30 p.m. and 5:30 p.m. During this time, 667 respondents reported being on the road. Although the peak hour is defined as the hour with the most congestion, relatively congested conditions last for up to three hours. In the North Bay the evening peak period occurs between 4 p.m. and 7 p.m. Residents were asked about their trip purpose, mode choice, and origin and destination during this extended period.

C. PURPOSE OF TRIPS

Although there are only four types of trips, each type may be made in two directions. For example, the home-based work trip consists of two choices: home-to-work or work-to-home. The following table lists the total number of trip purposes for each of four pairs. It should be noted that this table includes responses from households that reported trips; 41% of the respondents reported that they did not make a trip during the evening peak period. Also, the total number of trips exceeds the sample size of 1034 because some people took more than one trip during the evening peak period.

Table 4. Purpose of Trips During the Evening Peak Period

Type of Trip	Sample		Marin		Sonoma	
	#	%	#	%	#	%
Work to Home	648	51.2	507	53.3	141	44.9
Home to Work	38	3.0	30	3.2	8	2.6
Work to Other	132	10.4	98	10.3	34	10.8
Other to Work	14	1.1	10	1.1	4	1.3
Home to Shopping	176	13.9	129	13.6	47	15.0
Shopping to Home	129	10.2	97	10.2	32	10.2
Home to Recreation	81	6.4	48	5.0	33	10.5
Recreation to Home	48	3.8	33	3.5	15	4.8
Total	1266	100.0	952	100.2	314	100.1

The predominant trip occurring during the evening peak period was the work-to-home trip, with fifty-three percent (53%) of Marin residents returning home and forty-five percent (45%) of Sonoma residents returning home. After arriving home, the most common travel activity was to go shopping. About one-quarter of the respondents made shopping trips. Instead of going directly home from work, another ten percent of Marin and Sonoma residents stopped on the way, a "work-to-other" trip. Ten percent (10%) of Sonoma County residents reported traveling to a recreation facility during the evening peak, but only five percent (5%) of Marin County residents did so.

The trips reported in Table 4 indicate that the congestion experienced during the evening peak period is exacerbated by errands (work-to-other trips) and home-based shopping or recreation trips. Transportation engineers have labeled these types of trips "discretionary" because individuals have control over when to make the trip. Many residents made discretionary trips during the evening peak period.

It may be inaccurate to conclude that residents return to the most congested streets and highways for the discretionary trips. People who make discretionary trips may be going places which do not require a northbound drive on the freeway (or badly congested local roads) or they may make these trips when traffic congestion is lighter, around 7 p.m.

Because 41% of the respondents said that they did not make a trip during the peak period, it may be reasonable to assume that the remaining 59%, give or take a few percent, were responsible for the congestion experienced at the time of the survey.

D. MODE CHOICE

Mode choice refers to the transportation mode used to make the trip. Examples of modes are driving alone, carpool, bus, or ferry. By far the most common choice was to drive alone. Seventy-five percent of respondents did so. The next most common alternative was to carpool. A carpool was defined as two or more persons in an automobile.

There were slight differences in mode choices between Marin and Sonoma residents. Marin residents were a little more likely to drive alone or use transit such as bus or ferry. Almost all of the transit trips were transbay; people used transit for commuting to and from San Francisco. Compared to Marin residents, Sonoma residents were less likely to drive alone and more likely to carpool than use transit. This difference is most likely attributable to the smaller percentage of Sonoma residents who commute to San Francisco's Financial District, a place well served by mass transit. The mode choices, frequencies, and percentages for the total sample, and for Marin and Sonoma Counties are listed in the following table.

Table 5. 1987 Travel Pattern Survey: Mode Choice

Mode	Sample		Marin		Sonoma	
	#	%	#	%	#	%
Drive Alone	1141	75.7	876	77.1	265	71.4
Carpool	240	15.9	153	13.5	87	23.5
Bus	55	3.6	50	4.4	5	1.4
Walk	25	1.7	16	1.4	9	2.4
Other	18	1.2	16	1.4	2	0.5
Ferry	12	0.8	12	1.1	0	0.0
Vanpool	11	0.7	10	0.9	1	0.3
Bicycle	5	0.3	3	0.3	2	0.5
Total	1507	100.0	1136	100.1	371	100.0

Source: Marin County Planning Department

E. ORIGIN AND DESTINATION OF TRIPS

The respondent was asked the origin and destination of the trip for each type of trip made during the evening peak period. Because the question covered the evening commute period, the travel patterns conformed generally to expectations: most respondents were returning home from work. In the North Bay, most people live north of their jobs.

Table 6 illustrates the travel pattern of work-to-home trips, the predominant trip type during the evening peak period. For purposes of the table, trips have been classified as: within the same city, northbound to the resident's home, or southbound to the resident's home. In the Highway 101 Corridor, traveling southbound to home is called a "reverse commute" because the commuter is traveling in the opposite direction of heavy traffic. Because of the relatively small sample size, the actual number of trips used to generate the percentages is small, ranging from 172 trips in San Rafael to only 15 trips in Sausalito and Sonoma. Therefore, the interpretation should be viewed as indicative of probable behavior rather than an accurate representation of actual behavior.

Santa Rosa had the largest percentage of work-to-home trips, probably because it is the largest city in the North Bay and has a high number of jobs relative to its population. Santa Rosa residents have a better opportunity for living and working in the same area due to the city's jobs-housing balance.

**Table 6. 1987 Travel Pattern Survey: Direction of Work to Home Trips
(Percentage of Trips Remaining Within City, Northbound or Southbound)**

City	Within Same City	Northbound to Home	Southbound to Home
Santa Rosa	67.9	24.7	7.4
Rohnert Park-Cotati	26.1	39.1	34.8
Sonoma	33.3	53.3	13.3
Petaluma	35.9	51.3	12.8
Novato-Ignacio	23.0	67.2	9.8
San Rafael	44.2	43.0	12.8
San Anselmo-Fairfax	20.0	51.7	28.3
Ross-Kentfield-Greenbrae	11.8	67.7	20.6
Larkspur-Corte Madera	17.0	39.6	43.4
Mill Valley	24.5	57.1	18.4
Tiburon-Belvedere	17.6	29.4	52.9
Sausalito-Marin City	23.5	35.3	41.2

Source: Marin County Planning Department

The Rohnert Park-Cotati area provides fewer opportunities for living and working in the same location. As a result, the survey showed that residents returned home from jobs in Santa Rosa and points south. Sonoma, Petaluma, and Novato residents showed a greater propensity to hold jobs south of those cities, jobs primarily in San Rafael and San Francisco. In San Rafael, the percentage of "within same city" trips rose, indicating the availability of jobs for local residents. South of San Rafael the predominant pattern shifted somewhat. With the exception of Mill Valley respondents, a relatively high percentage of the people in Southern Marin were reverse commuters, returning home from jobs located north of home. A high percentage of Mill Valley residents returned from jobs in San Francisco.

The percentage of work-to-home trips remaining within a city is an indicator of the city's economic self-sufficiency. To the extent that the city offers its residents the opportunity to live, work, shop, and recreate within the city, the greater the percentage of trips that will remain within the city. Conversely, lower percentages indicate that residents choose to travel outside their city for work, shopping, and recreation.

One important caveat to this statement is that a city's size influences its potential for economic self-sufficiency. For example, within the study area, Santa Rosa was the largest city and, therefore, had the greatest potential for keeping trips within its borders. Novato and San Rafael were smaller and, therefore, had lower percentages of "within same city" trips than Santa Rosa. If Novato and San Rafael were combined to create a city as big as Santa Rosa, however, their combined percentage of within-city trips would be greater than that of Santa Rosa. Also, due to the lack of alternate north-south roads in Marin, even people who live and work in the same city may use Highway 101 for commuting. This is especially noticeable in San Rafael where the freeway is most congested during the evening peak period.

In addition to measuring the number of trips occurring within and between cities, the study sought to document the trips occurring within and between counties. Since Sonoma County households were underrepresented in the sample, it was necessary to separate Marin and Sonoma residents first, and then calculate the percentage of trips occurring between counties separately for Marin and Sonoma residents. Again, because of the undersampling of Sonoma County residents, the percentage of trips, not the number of trips, was the appropriate measure. Given the random sampling technique used to select the households, it is statistically valid to assume that, within a margin of error, all households in the respective counties make trips similar to the households sampled.

The origin-destination table used to determine the degree of inter-county commuting was the work-to-home trip table. The work-to-home trip is the trip type most common to the evening peak period and most likely to be made between counties. Table 7 shows the percent of work to home trips originating in Marin, Sonoma, Solano, San Francisco, and East Bay counties and ending in Marin or Sonoma Counties.

Table 7. 1987 Travel Pattern Survey: Work-to-Home Trips Between Counties for Marin and Sonoma Residents, Evening Peak Period

Working In	Living in Marin	Living in Sonoma
Marin	64.2%	15.5%
Sonoma	3.8	74.5
Solano	0.1	1.2
San Francisco	24.9	5.0
East Bay	6.9	3.7
Total	99.9%	99.9%

Source: Marin County Planning Department

The data in Table 7 indicates a high degree of within-county commuting. Sixty-four percent (64%) of Marin County residents reported living and working in Marin County. An even higher percentage of Sonoma County residents reported living and working in Sonoma County (74.5%). Commuting between counties reflected the northbound orientation of evening traffic. During the evening peak period, just over fifteen percent (15%) of Sonoma County residents returned from jobs in Marin and one-quarter of Marin County residents returned from jobs in San Francisco.

F. AVERAGE TRIP LENGTH

The travel patterns shown in the origin-destination tables were corroborated by measuring average trip lengths: the distance residents of a given area commute from their jobs. Sonoma County residents commuted an average of 13.4 miles home from work; Marin County residents commuted an average of 11.0 miles. The average trip length was longer for Sonoma residents primarily because some of them made long commutes from San Francisco and the East Bay, which raises the average.

Table 8 lists the average trip lengths for Marin and Sonoma County residents, including the average trip lengths for residents of the cities within the counties. The table shows that average trip lengths were lower when more residents were able to work closer to home.

Table 8. Average Trip Length

Residential Area	Trip Length (Miles)
Sonoma County	13.4
Santa Rosa	8.5
Rohnert Park-Cotati	12.9
Sonoma	21.3
Petaluma	16.9
Marin County	11.0
Novato	18.0
Ignacio	12.7
San Rafael	7.6
San Anselmo-Fairfax	9.7
Ross-Kentfield	10.9
Larkspur-Corte Madera	9.2
Mill Valley	9.3
Tiburon-Belvedere	12.9
Sausalito-Marin City	10.4

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that the study of history is essential for a full understanding of the present and for the development of a sense of responsibility for the future. The second part of the paper discusses the importance of the study of the history of the United States. It is argued that the study of history is essential for a full understanding of the present and for the development of a sense of responsibility for the future.

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APPENDIX A

Year	Population	Area
1790	3,929,214	3,536,990
1800	3,929,214	3,536,990
1810	3,929,214	3,536,990
1820	3,929,214	3,536,990
1830	3,929,214	3,536,990
1840	3,929,214	3,536,990
1850	3,929,214	3,536,990
1860	3,929,214	3,536,990
1870	3,929,214	3,536,990
1880	3,929,214	3,536,990
1890	3,929,214	3,536,990
1900	3,929,214	3,536,990
1910	3,929,214	3,536,990
1920	3,929,214	3,536,990
1930	3,929,214	3,536,990
1940	3,929,214	3,536,990
1950	3,929,214	3,536,990
1960	3,929,214	3,536,990
1970	3,929,214	3,536,990
1980	3,929,214	3,536,990
1990	3,929,214	3,536,990
2000	3,929,214	3,536,990
2010	3,929,214	3,536,990
2020	3,929,214	3,536,990

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